All India Test Series (2023-24)

Test Code: ANY/13 | **AITS TEST - 13** | **YAKEEN NEET**

DURATION: 200 Minutes | **DATE: 29/04/2024** | **M. MARKS: 720**

ANSWER KEY

(PHYSICS)

SECTION-A

1.	(2)	8.	(2)	15.	(4)	22.	(3)	29.	(1)
2.	(4)	9.	(1)	16.	(1)	23.	(3)	30.	(4)
3.	(4)	10.	(1)	17.	(1)	24.	(1)	31.	(4)
4.	(1)	11.	(3)	18.	(4)	25.	(1)	32.	(1)
5.	(1)	12.	(1)	19.	(3)	26.	(4)	33.	(3)
6.	(4)	13.	(2)	20.	(4)	27.	(1)	34.	(1)
7.	(3)	14.	(1)	21.	(4)	28.	(4)	35.	(2)

SECTION-B

36.	(1)	39.	(3)	42.	(2)	45.	(1)	48.	(3)
37.	(2)	40.	(2)	43.	(3)	46.	(1)	49.	(2)
38.	(2)	41.	(3)	44.	(3)	47.	(1)	50.	(3)

(CHEMISTRY)

SECTION-A

51.	(4)	58.	(1)	65.	(1)	72.	(1)	79.	(4)
52.	(4)	59.	(3)	66.	(2)	73.	(4)	80.	(2)
53.	(2)	60.	(1)	67.	(1)	74.	(3)	81.	(2)
54.	(2)	61.	(2)	68.	(1)	75.	(3)	82.	(1)
55.	(2)	62.	(1)	69.	(2)	76.	(4)	83.	(1)
56.	(2)	63.	(1)	70.	(3)	77.	(4)	84.	(1)
57.	(4)	64.	(1)	71.	(2)	78.	(1)	85.	(1)

SECTION-B

86.	(4)	89.	(4)	92.	(1)	95.	(2)	98.	(2)
87.	(4)	90.	(2)	93.	(4)	96.	(3)	99.	(2)
88.	(1)	91.	(2)	94.	(2)	97.	(4)	100.	(4)

(BOTANY)

SECTION-A

101.	(2)	108.	(2)	115.	(3)	122.	(2)	129.	(2)
102.	(2)	109.	(3)	116.	(4)	123.	(4)	130.	(1)
103.	(4)	110.	(4)	117.	(2)	124.	(3)	131.	(3)
104.	(1)	111.	(2)	118.	(2)	125.	(3)	132.	(4)
105.	(2)	112.	(3)	119.	(3)	126.	(1)	133.	(2)
106.	(1)	113.	(2)	120.	(4)	127.	(3)	134.	(4)
107.	(3)	114.	(2)	121.	(4)	128.	(4)	135.	(1)

SECTION-B

136.	(1)	139.	(3)	142.	(4)	145.	(1)	148.	(2)
137.	(4)	140.	(2)	143.	(3)	146.	(3)	149.	(1)
138.	(1)	141.	(1)	144.	(3)	147.	(4)	150.	(2)

(ZOOLOGY)

SECTION-A

151.	(4)	158.	(4)	165.	(4)	172.	(1)	179.	(2)
152.	(1)	159.	(2)	166.	(2)	173.	(4)	180.	(3)
153.	(4)	160.	(3)	167.	(2)	174.	(1)	181.	(4)
154.	(2)	161.	(4)	168.	(2)	175.	(3)	182.	(2)
155.	(3)	162.	(4)	169.	(2)	176.	(3)	183.	(1)
156.	(3)	163.	(1)	170.	(2)	177.	(1)	184.	(3)
157.	(2)	164.	(3)	171.	(4)	178.	(2)	185.	(3)

SECTION-B

186.	(1)	189.	(1)	192.	(2)	195.	(3)	198.	(2)
187.	(4)	190.	(4)	193.	(4)	196.	(2)	199.	(3)
188.	(4)	191.	(4)	194.	(1)	197.	(2)	200.	(2)

Hints & Solutions

[AITS-13 || Yakeen-NEET || 29-04-2024]

(PHYSICS)

SECTION-A

1. (2)

$$E_{Total} = \frac{1}{2}kA^2 = \frac{1}{2}m\omega^2 A^2 = 20$$

$$\Rightarrow (\omega A)^2 = 400$$

$$\omega A = 20$$

$$\omega = \frac{20}{2\times10^{-2}} = 1000 \text{ rad/s}$$

(NEW NCERT 11th Page No. 268)

2. (4)

Frequency of light depends on the source. Due to refraction, there is no change on the frequency of incident light and colour depends on frequency.

(NEW NCERT 12th Page No. 229)

3. (4)

Induced electric field is present both inside as well as outside the given cylindrical region.

(NEW NCERT 12th Page No. 163)

4. (1)

$$y = ax - bx^2$$

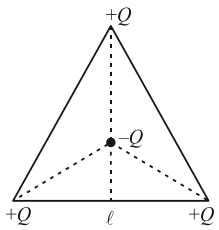
$$y = ax\left(1-\frac{bx}{a}\right) = ax\left(1-\frac{x}{a/b}\right)$$

Comparing with $y = x\tan\theta\left(1-\frac{x}{R}\right)$

$$R = \frac{a}{b}$$

(NEW NCERT 11th Page No. 39)

5. (1)



For four charges, pairs for potential energy are

$$\frac{4\times3}{2} = 6 \text{ pairs}$$

$$U = \frac{3kQ^2}{\ell} - \frac{3kQ^2\sqrt{3}}{\ell}$$

$$= \frac{3kQ^2}{\ell}\left(1-\sqrt{3}\right)$$

(NEW NCERT 12th Page No. 55)

6. (4)

$$F_{\min} = \mu_s(20) + \mu_s(30) = 0.3\times20 + 0.2\times30 = 12\,\text{N}$$

(NEW NCERT 11th Page No. 59)

7. (3)

Nuclear density is of the order 10^{17} kg/m^3

(NEW NCERT 12th Page No. 309)

8. (2)

$$F = BIL$$

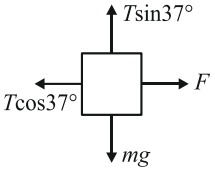
$$[B] = \left[\frac{F}{IL}\right] = \frac{[MLT^{-2}]}{[A][L]} = [ML^0T^{-2}A^{-1}]$$

(NEW NCERT 12th Page No. 113)

9. (1)

T is the tension in the string

F.B.D of the block



For equilibrium

$$\frac{3T}{5} = mg$$

$$\frac{4T}{5} = F$$

$$\Rightarrow \frac{3}{4} = \frac{mg}{F}$$

$$F = \frac{4mg}{3}$$

(NEW NCERT 11th Page No. 64)

10. (1)

$$(C_V)_{mix} = \frac{n_1C_{V_1} + n_2C_{V_2}}{n_1+n_2} = \frac{1\times\frac{3R}{2} + 2\times\frac{5R}{2}}{3} = \frac{13R}{6}$$

(NEW NCERT 11th Page No. 231)

11. (3)

Using conservation of linear momentum

initial momentum = Final momentum = 0

$\Rightarrow$ Both particles have same magnitude of linear momentum after breaking.

As $\lambda_{dB} = \frac{h}{P}$

Both the particles have same de-Broglie wavelength.

(NEW NCERT 12th Page No. 284)

12. (1)

$$V_{rms} \propto \sqrt{\frac{T}{M}}$$

$$\Rightarrow \frac{T}{2} = \frac{320}{32}$$

T = 20 K

(NEW NCERT 11th Page No. 248)

13. **(2)**

$$S = u + \frac{a}{2}(2n-1)$$

$$\frac{S_1}{S_5} = \frac{[(2\times1)-1]}{[(2\times5)-1]} = \frac{1}{9}$$

(NEW NCERT 11th Page No. 17)

14. **(1)**

The equation $y = A\sin(\omega t - kx)$ represents a progressive wave along $+x$ direction.

(NEW NCERT 11th Page No. 281)

15. **(4)**

$$i_d = \varepsilon_0 \frac{d\phi_E}{dt} = \varepsilon_0 \frac{d(EA)}{dt} = \varepsilon_0 A \frac{d}{dt}\left(\frac{V}{d}\right)$$

$$i_d = \frac{\varepsilon_0 A}{d}\left(\frac{dV}{dt}\right) = C\left(\frac{dV}{dt}\right) = 5\ \mu A$$

(NEW NCERT 12th Page No. 202)

16. **(1)**

Capacitance depends on dimensions of capacitor and is independent of charge on capacitor and potential difference applied.

(NEW NCERT 12th Page No. 67)

17. **(1)**

Slope of graph A > slope of graph B

$\Rightarrow$ Young's modulus of A > Young's modulus of B

$\therefore$ Material A is more elastic.

(NEW NCERT 11th Page No. 169)

18. **(4)**

Let the tangential acceleration is a

$$S = ut + \frac{1}{2}at^2$$

Given $u = 0$ and $t = 5$ s

$$5\times2\pi r = \frac{1}{2}a(25)$$

$$5\times2\pi\times\frac{25}{\pi} = \frac{25}{2}(a)$$

$\Rightarrow a = 20$ m/s^2

(NEW NCERT 11th Page No. 63)

19. **(3)**

Kepler's second Law is based on Law of conservation of angular momentum

(NEW NCERT 11th Page No. 128)

20. **(4)**

$$B = \frac{\mu_0}{4\pi}\frac{(M)}{r^3}\sqrt{3\cos^2\theta+1}$$

$$= \frac{\mu_0}{4\pi}\frac{(M)}{r^3}\sqrt{\frac{3\times3}{4}+1}$$

$$= \frac{\mu_0 M}{4\pi\, r^3}\sqrt{\frac{13}{4}} = \frac{\sqrt{13}\mu_0 M}{8\pi r^3}$$

(NEW NCERT 12th Page No. 137)

21. **(4)**

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

Given $f = -30$ cm, $u = +15$ cm

$$\frac{1}{v} = \frac{1}{u} + \frac{1}{f} = \frac{1}{15} - \frac{1}{30} = \frac{1}{30}$$

$\Rightarrow v = 30$ cm

(NEW NCERT 12th Page No. 233)

22. **(3)**

$$W = \Delta U = U_f - U_i = -pE\cos60° - (-pE\cos0°)$$

$$W = \frac{-pE}{2} + pE = \frac{pE}{2}$$

$$W' = -pE\cos180° - (-pE\cos0°)$$

$$W' = +pE + pE = 2pE = 2(2W) = 4W$$

(NEW NCERT 12th Page No. 58)

23. **(3)**

As bulbs are identical they have same resistance.

$P \propto i^2$

Current in B_2 and B_3 branch is equal but less than current passing through B_1.

$\therefore$ Brightness of $B_1 > B_2 = B_3$

(NEW NCERT 12th Page No. 92)

24. **(1)**

$\lambda_m \propto \frac{1}{T}$ which represents rectangular hyperbola

(NEW NCERT 11th Page No. 217)

25. **(1)**

$$mg = kx \Rightarrow x = \frac{mg}{k} \quad \ldots(1)$$

After submerging $W' = mg - F_B$

$$\frac{3kx}{4} = mg - F_B$$

From (1)

$$F_B = \frac{mg}{4}$$

$$\rho_\ell Vg = \frac{\rho_s Vg}{4}$$

$\Rightarrow \rho_s = 4\rho_\ell = 4\rho$

(NEW NCERT 11th Page No. 185)

26. **(4)**

$$f = \frac{v}{4L_i} = 200$$

$$f' = \frac{5v}{\frac{4L_i}{2}} = \frac{5v}{2L_i}$$

$$= \frac{5}{2}\times800 = 2000\ \text{Hz}$$

(NEW NCERT 11th Page No. 290)

27. **(1)**

$9=\frac{x}{\mu},\ 5=\frac{y}{\mu}$

$\Rightarrow$ Thickness $=x+y=14\times\frac{3}{2}=21\text{cm}$

(NEW NCERT 12th Page No. 230)

28. **(4)**

Initially volume decreases and then it increases.
Work done is first negative and then positive.

(NEW NCERT 11th Page No. 229)

29. **(1)**

$F=\frac{k}{r^3}=\frac{mv^2}{r}$

$\Rightarrow \sqrt{\frac{k}{mr^2}}=v$

$\Rightarrow v\propto\frac{1}{r}$

(NEW NCERT 11th Page No. 137)

30. **(4)**

Moment of inertia depends on all the given parameters.

(NEW NCERT 11th Page No. 114)

31. **(4)**

Maximum value of V

$V_{\max}=\sqrt{V_1^2+V_2^2}$

$V_{rms}=\frac{V_{\max}}{\sqrt{2}}=\sqrt{\frac{V_1^2+V_2^2}{2}}$

(NEW NCERT 12th Page No. 177)

32. **(1)**

Some electrons do not come out even if incident energy is greater than work function.

(NEW NCERT 12th Page No. 281)

33. **(3)**

$y=\frac{x^2}{a}$

$\frac{dy}{dx}=\frac{2x}{a}=\tan\theta=\mu$

$\Rightarrow x=\frac{\mu a}{2}$

Height = value of y at $x=\frac{\mu a}{2}$

$=\left(\frac{\mu a}{2}\right)^2\times\frac{1}{a}=\frac{\mu^2 a}{4}$

(NEW NCERT 11th Page No. 64)

34. **(1)**

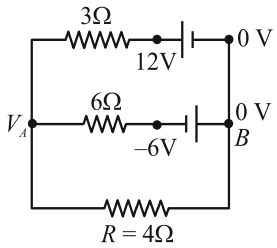
According to Lenz Law the magnetic flux through the loop decreases.

$\therefore$ Current is induced in clockwise sense.

(NEW NCERT 12th Page No. 160)

35. **(2)**

Assume potential of point B is zero and that of point A as V_A



Applying nodal analysis at point A

$\frac{V_A-12}{3}+\frac{V_A+6}{6}+\frac{V_A-0}{4}=0$

$\Rightarrow 4(V_A-12)+2(V_A+6)+3V_A=0$

$\Rightarrow 9V_A-36=0$

$\Rightarrow V_A=4\text{V}$

$\therefore V_A-V_B=4\text{V}$

(NEW NCERT 12th Page No. 95)

SECTION-B

36. **(1)**

$S=t^3-6t^2+9t$

$\frac{dS}{dt}=V=3t^2-12t+9=0$

$\Rightarrow t^2-4t+3=0$

$\Rightarrow t^2-t-3t+3=0$

$t(t-1)-3(t-1)=0$

$(t-1)(t-3)=0$

$t=1,\ t=3$

Time interval = 2 s

(NEW NCERT 11th Page No. 14)

37. **(2)**

Value of g at distance $\frac{R}{2}$ from center

$g'=g\left(1-\frac{R}{2R}\right)=\frac{g}{2}$

Thus, weight becomes half.

(NEW NCERT 11th Page No. 133)

38. **(2)**

$c=\frac{1}{(\mu_0\varepsilon_0)^{\frac{1}{2}}}$

$\left[\left(\frac{1}{\mu_0\varepsilon_0}\right)^{\frac{1}{2}}\right]=[c]=[LT^{-1}]$

(NEW NCERT 11th Page No. 7)

39. (3)

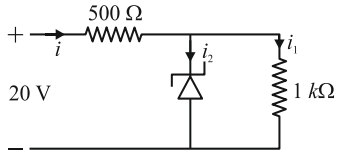
After absorbing the energy electron moves to $n = 4$

Orbital angular momentum changes by $= \frac{3h}{2\pi}$

$$= \frac{3 \times 6.63 \times 10^{-34}}{2 \times 3.14} = 3.17 \times 10^{-34} \text{ J s}$$

(NEW NCERT 12th Page No. 297)

40. (2)



Voltage across 1 kΩ resistor is 8 V

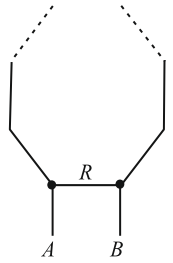
$i_1 = 8$ mA

$$i = \frac{12}{500} = 24 \text{ mA}$$

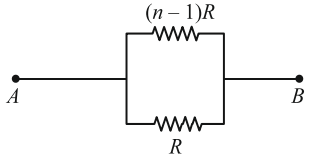
$i_2 = i - i_1 = 16$ mA

(NEW NCERT 12th Page No. 335)

41. (3)



Equivalent circuit is



$$R_{eq} = \frac{(R)(n-1)(R)}{nR - R + R}$$

$$R_{eq} = \left(\frac{n-1}{n}\right)R$$

(NEW NCERT 12th Page No. 98)

42. (2)

The image of objective should form at the focus of eyepiece

$\therefore$ Image of object is at 20 cm from the objective

Using lens formula.

$$\frac{1}{20} - \frac{1}{u_0} = \frac{1}{4}$$

$$\Rightarrow \frac{1}{20} - \frac{1}{4} = \frac{1}{u_0}$$

$$\Rightarrow \frac{1-5}{20} = \frac{1}{u_0}$$

$$\Rightarrow \frac{-4}{20} = \frac{1}{u_0}$$

$$\Rightarrow u_0 = 5 \text{ cm}$$

(NEW NCERT 12th Page No. 241)

43. (3)

For ideal transformer there is no power loss.

Input and output power is same.

(NEW NCERT 12th Page No. 194)

44. (3)

$$V_A - 20 - 2 - 2 \times 3 = 0$$

$\Rightarrow V_A = 28$ V

(NEW NCERT 12th Page No. 165)

45. (1)

T = constant

$PM = \rho RT$

As T is constant, $P \propto \rho$. Pressure is decreasing therefore density should also decrease.

(NEW NCERT 11th Page No. 233)

46. (1)

$$L = mvr_{\perp} = mvH$$

$$= 2 \times (u\cos 60°) \times \frac{u^2 \sin^2 \theta}{2g}$$

$$= \frac{20 \times 400 \times 3}{4 \times 20} = 300 \text{ kg m}^2/\text{s}$$

(NEW NCERT 11th Page No. 105)

47. (1)

Let intensity incident be I

After passing through polarizer intensity becomes $\frac{I}{2}$. After passing through analyzer intensity becomes $\frac{I}{2}\cos^2 45°$

Given $\frac{I}{2}\left(\frac{1}{2}\right) = 2I_0$

$\Rightarrow I = 8I_0$

(NEW NCERT 12th Page No. 269)

48. (3)

Height after three collisions H'

$$H' = e^6 H = \frac{100}{2^6} = 1.5625$$

(NEW NCERT 11th Page No. 83)

49. (2)

$$I = \int F dt$$

$$= \int_0^{10} (6 - 8t) dt$$

$$= \left[6t - 4t^2\right]_0^{10}$$

$= 60 - 400 = -340$ N s

(NEW NCERT 11th Page No. 52)

50. (3)

$H = R$ when the range is maximum i.e., hole is at half of depth.

(NEW NCERT 11th Page No. 188)

(CHEMISTRY)

SECTION-A

51. (4)

de-Broglie wavelength (λ) for electron is given by

$$\lambda = \frac{h}{\sqrt{2mK.E}}$$

Also, according to photoelectric effect

$$KE = h\nu - h\nu_0$$

$$\lambda = \frac{h}{\sqrt{2m \times (h\nu - h\nu_0)}}$$

$$\lambda \propto (\nu - \nu_0)^{-\frac{1}{2}}$$

(NEW NCERT 11th Part-I Page No. 50)

52. (4)

$C(s) + O_2(g) \longrightarrow CO_2(g)$;

$\because$ Heat released on formation of 44 g CO_2

$= -3.935 \times 10^5$ J/mol

$\because$Heat released on formation of 88 g CO_2

$= \frac{-3.935 \times 10^5}{44} \times 88 = -7.87 \times 10^5$ J/mol

$= -787$ kJ/ mol

(NEW NCERT 11th Part-I Page No. 149)

53. (2)

- Borax contains tetranuclear units $[B_4O_5(OH)_4]^{2-}$ and correct formula; therefore, is $Na_2[B_4O_5(OH)_4].8H_2O$.
- On heating, orthoboric acid above 370K forms metaboric acid, HBO_2 which on further heating yields boric oxide, B_2O_3.

$$H_3BO_3 \xrightarrow{\Delta} HBO_2 \xrightarrow{\Delta} B_2O_3$$

(OLD NCERT 11th Part-I Page No. 312)

54. (2)

$2\,C_{57}H_{110}O_6(s) + 163\,O_2(g) \rightarrow 110\,H_2O(l) + 114\,CO_2(g)$

Molecular mass of 110 H_2O = 110(2+16) = 1980 g

1780 g of $C_{57}H_{110}O_6$ produces = 1980 g of H_2O

356 g of $C_{57}H_{110}O_6 = \frac{1980}{1780} \times 356 = 396$ g

(NEW NCERT 11th Part-I Page No. 18)

55. (2)

Sucrose is linked through a glycosidic linkage between C1 of α-glucose and C2 of β-fructose. Since, the reducing groups of glucose and fructose are involved in glycosidic bond formation, sucrose is a non-reducing sugar, and does not reduces fehling's solution.

(NEW NCERT 12th Part-II Page No. 287)

56. (2)

$$k = Ae^{-E_a/RT} \quad \ln k = \ln A - \frac{E_a}{RT}$$

$$\log k = \log A - \frac{E_a}{2.303\,RT}$$

$\frac{-E_a}{2.303\,R}$ is the slope of Arrhenius plot.

Slope $= -3 \times 10^6$

$$\frac{-E_a}{2.303\,R} = -3 \times 10^6$$

$E_a = 2.303 \times 8.314 \times 3 \times 10^6$

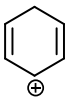
$E_a = 57.44 \times 10^6$ J mol^{-1}

$E_a = 57.44 \times 10^3$ kJ mol^{-1}

(NEW NCERT 12th Part-I Page No. 79)

57. (4)

Aromatic compounds are stable due to resonance while non-aromatic compounds are not.

 is non-aromatic.

Hence, it is least stabilised by resonance.

(NEW NCERT 11th Part-II Page No. 261)

58. (1)

With the increase in size and mass of halogen atom, the magnitude of van der Waal forces increases. Thus, the order of boiling points of alkyl halides is: RI > RBr > RCl > RF.

(NEW NCERT 12th Part-II Page No. 168)

59. (3)

$N_2 + 3H_2 \rightleftharpoons 2NH_3$, K_1 ……..…(i)

$N_2 + O_2 \rightleftharpoons 2NO$, K_2 ……..…….(ii)

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O$, K_3……..…(iii)

On reversing the equation (i) and multiplying it by 2 we get,

$4NH_3 \rightleftharpoons 2N_2 + 6H_2$, $\frac{1}{K_1^2}$ ……..…(iv)

On multiplying the equation (ii) by 2, we get

$2N_2 + 2O_2 \rightleftharpoons 4NO$, K_2^2 ……..(v)

On multiplying the equation (iii) by 6, we get

$6H_2 + 3O_2 \rightarrow 6H_2O$, K_3^6 ……(vi)

Now, add equation (iv), (v) and (vi), we get the resultant equation, for which

$$K = \frac{K_2^2 K_3^6}{K_1^2}$$

(NEW NCERT 11th Part-I Page No. 67)

60. (1)

Aromatic electrophilic substitution reactions are fast in those compounds in which the attacking site possess high electron density. Electron withdrawing groups (EWG) reduces the electron density in the benzene ring due to its strong –I or –M effect and makes further substitution difficult. While electron releasing groups (ERG) increases the electron density in the benzene due to resonance. So, the correct order is;

IV < III < I < II

(NEW NCERT 11th Part-II Page No. 322)

61. (2)

Molality of non-electrolyte solute

$$= \frac{10}{500 \times 102.4} \times 1000$$

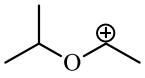
$$= \frac{20}{102.4}$$

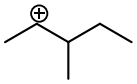
$\Delta T_f = k_f \times m$

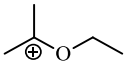
$$= 5.12 \times \frac{20}{102.4} = 1 \text{ K}$$

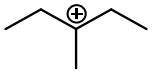
(NEW NCERT 12th Part-I Page No. 18)

62. (1)

I.  → 2° carbocation and resonance stabilised

II.  → 2° carbocation but not resonance stabilised

III.  → 3° carbocation and resonance stabilised

IV.  → 3° carbocation but not resonance stabilised

Therefore, overall stability order is: II < IV < I < III

(NEW NCERT 11th Part-II Page No. 272)

63. (1)

n-propylamine ($CH_3CH_2CH_2NH_2$) can be prepared by Gabriel phthalimide reaction. This method produces only aliphatic primary amines. In this method, phthalimide is treated with ethanolic KOH, it forms potassium salt of phthalimide which on heating with alkyl halide followed by alkaline hydrolysis forms corresponding primary amines.

(NEW NCERT 12th Part-II Page No. 264)

64. (1)

Since copper is placed below hydrogen in the electrochemical series, thus copper does not give hydrogen with dilute acids.

(NEW NCERT 12th Part-I Page No. 56)

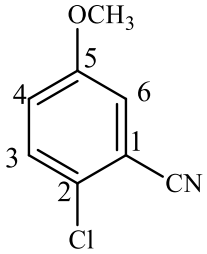
65. (1)

Among acid derivatives, the reactivity towards nucleophilic acyl substitution is in the order:

$CH_3CONH_2 < CH_3COOC_2H_5 < (CH_3CO)_2O < CH_3COCl$

(NEW NCERT 12th Part-I Page No. 236)

66. (2)



(2-Chloro-5-methoxybenzonitrile)

(NEW NCERT 11th Part-II Page No. 262)

67. (1)

- In aqueous solution:

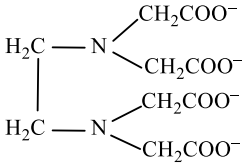
$$H^+ \xrightarrow{H_2O} H_3O^+ \xrightarrow{H_2O} H_5O_2^+ \xrightarrow{H_2O} H_7O_3^+$$

- KBr is a salt of strong acid and strong base, so does not hydrolyse.

(NEW NCERT 11th Part-I Page No. 188)

68. (1)

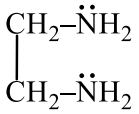
(I) Ethylenediaminetetraacetate ion ($EDTA^{4-}$)



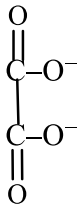
(II) Thiocyanate ion: SCN^-

SCN^- ion can coordinate through S or N atom, due to which it is ambidentate ligand.

(III) ethane-1,2-diamine:

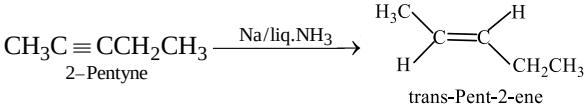


(IV) Oxalate:



(NEW NCERT 12th Part-I Page No. 121)

69. (2)



(NEW NCERT 11th Part-II Page No. 309)

70. (3)

(I) $[Fe(H_2O)_6]^{3+}$ → Paramagnetic and outer orbital complex

(II) $[Zn(NH_3)_6]^{2+}$ → Diamagnetic and outer orbital complex

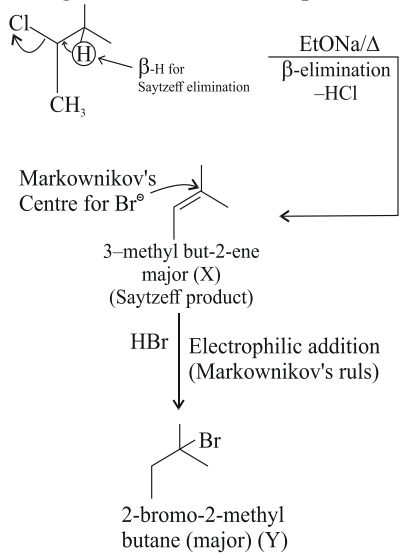
(III) $[Mn(CN)_6]^{3-}$ → Paramagnetic and Inner orbital complex

(IV) $[Co(NH_3)_6]^{3+}$ → Diamagnetic and Inner orbital complex

(NEW NCERT 12th Part-I Page No. 129)

71. (2)

The given reaction takes place as follows:



(NEW NCERT 12th Part-II Page No. 180)

72. (1)

The IUPAC name of $K_3[Co(C_2O_4)_2(Cl)_2]$ is Potassiumdichloridodioxalatocobltate(III).

(Oxidation number of Co = + 3, and ligands are arranged in alphabetical order)

(NEW NCERT 12th Part-I Page No. 123)

73. (4)

At anode:

$$2Cl^- \xrightarrow{-2e^-} Cl_2$$

$$W = \frac{Eit}{96500}$$

$$(0.5 \times 71) = \frac{35.5}{96500} \times 8 \times t$$

$$t = \frac{96500 \times 0.5 \times 71}{35.5 \times 8}$$

t = 12062.5 sec

t = 201 min

(NEW NCERT 12th Part-I Page No. 51)

74. (3)

(I) ZnO → Amphoteric oxide

(II) Al_2O_3 → Amphoteric oxide

(III) Na_2O → Basic oxide

(IV) Cl_2O → Acidic oxide

(NEW NCERT 11th Part-I Page No. 94)

75. (3)

$CaF_2 \rightleftharpoons Ca^{2+} + 2F^-$

K_{sp} of $CaF_2 = [Ca^{2+}][F^-]^2$

$= [4 \times 10^{-2}][8 \times 10^{-2}]^2$

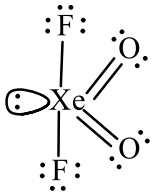
$= 256 \times 10^{-6}$

$= 2.56 \times 10^{-4}$

(NEW NCERT 11th Part-I Page No. 204)

76. (4)

F atom lies on axial position as it is more electro negative than O atom.



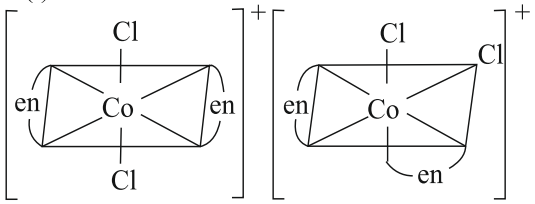
Total lone pair on F atom = 6.

(NEW NCERT 11th Part-I Page No. 116)

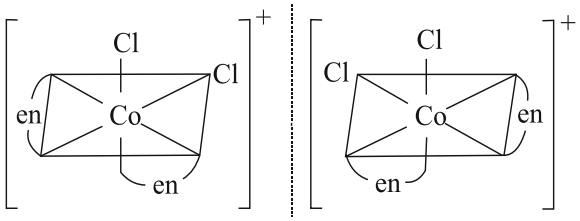
77. (4)

Complex $[Co(en)_2 Cl_2]$ will have three different isomers.

(i) Geometrical isomers



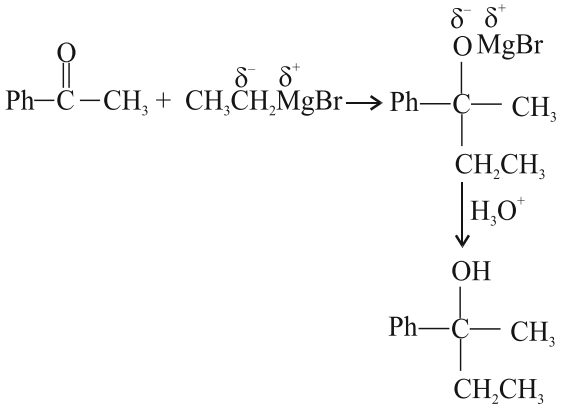
(ii) Optical isomers



Optically active cis-$[Co(en)_2Cl_2]Cl$

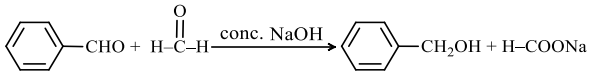
(NEW NCERT 12th Part-I Page No. 125)

78. (1)



(NEW NCERT 12th Part-II Page No. 201)

79. (4)



This is an example of cross Cannizzaro reaction in which formaldehyde is always oxidised.

(NEW NCERT 12th Part-II Page No. 242)

80. (2)

Vitamin B_6 is water soluble that is excreted out from body through urine.

(NEW NCERT 12th Part-II Page No. 296)

81. (2)

$E^0_{Cu^{2+}/Cu}$ is 0.34 volt mainly due to high $\Delta_a H^o$ and low $\Delta_{hyd} H^o$.

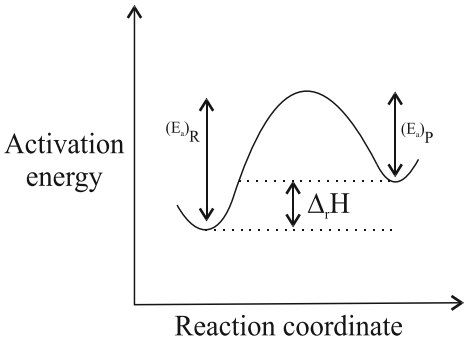
(NEW NCERT 12th Part-I Page No. 98)

82. (1)

Phosphinic acid	H_3PO_2	+1
Pyrophosphoric acid	$H_4P_2O_7$	+5
Pyrophosphorous acid	$H_4P_2O_5$	+3
Hypophosphoric acid	$H_4P_2O_6$	+4

(OLD NCERT 12th Part-I Page No. 179)

83. (1)

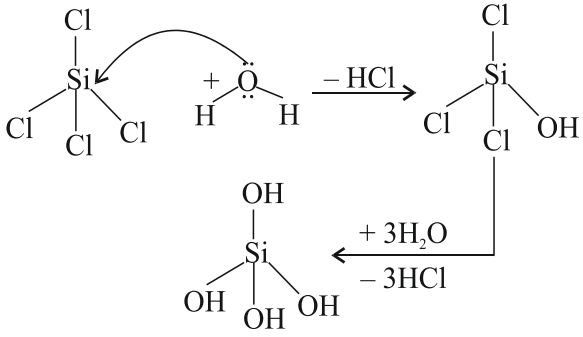


It is clear from the above plot that the activation energy of reactant is greater than the activation energy of products.

(NEW NCERT 12th Part-I Page No. 79)

84. (1)

$SiCl_4$ undergoes hydrolysis by initially accepting lone pair of electrons from water molecule in vacant d orbitals of Si, finally leading to the formation of $Si(OH)_4$.



(OLD NCERT 11th Part-I Page No. 317)

85. (1)

The molecular orbital configuration of C_2 is

$C_2 : \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \pi 2p_x^2 = \pi 2p_y^2$

C_2 consists of two π-bonds because of the presence of four electrons in two π-molecular orbitals.

(NEW NCERT 11th Part-I Page No. 130)

SECTION-B

86. (4)

The parameters which depends on the path by which the process is performed rather than on the initial and final states, are called path functions, such as work done and heat.

(NEW NCERT 11th Part-I Page No. 143)

87. (4)

For an isothermal irreversible expansion,

Work done $(W) = -P_{ext}(V_2 - V_1)$

$P_{ext} = 10^8$ N m^{-2}

$V_1 = 10^{-6}$ $dm^3 = 10^{-9}$ m^3

$V_2 = 10^{-4}$ $dm^3 = 10^{-7} m^3$

$W = -10^8[10^{-7} - 10^{-9}]$

$= -10^8 \times 10^{-9}\,[100 - 1]$

$= -10^{-1} \times 99$

$= -9.9$ N m $= -9.9$ J

(NEW NCERT 11th Part-I Page No. 142)

88. (1)

For second line of Balmer series; $n_1 = 2$ and $n_2 = 4$.

Thus,

$$\frac{1}{\lambda} = R_H Z^2 \left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

$$\frac{1}{\lambda} = R_H 4 \left[\frac{1}{4} - \frac{1}{16}\right]$$

$$\frac{1}{\lambda} = \frac{3R_H}{4}$$

$$\Rightarrow \quad \lambda = \frac{4}{3R_H}$$

(NEW NCERT 11th Part-I Page No. 45)

89. (4)

Due to more stable outer electronic configuration $2s^2$, Be has more IP than B ($2s^2 2p^1$).

(NEW NCERT 11th Part-I Page No. 87)

90. (2)

$MnO_4^- \Rightarrow Mn^{+7} = [Ar]3d^0$ (diamagnetic)

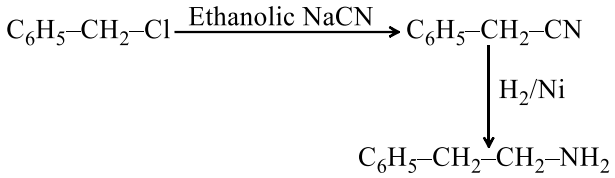
$MnO_4^{2-} \Rightarrow Mn^{+6} = [Ar]3d^1$ (paramagnetic)

$Cr_2O_7^{2-} \Rightarrow Cr^{+6} = [Ar]\ 3d^0$ (diamagnetic)

$CrO_4^{2-} \Rightarrow Cr^{+6} = [Ar]3d^0$ (diamagnetic)

(NEW NCERT 12th Part-I Page No. 106)

91. (2)



(NEW NCERT 12th Part-II Page No. 169)

92. (1)

- The solubility of aldehydes and ketones decreases rapidly on increasing the length of alkyl chain.
- The boiling point of aldehydes and ketones (polar) are higher than hydrocarbons (non-polar) of comparable molecular masses.

(NEW NCERT 12th Part-II Page No. 204)

93. (4)

For basic buffer,

$$pOH = pK_b + \log\frac{[salt]}{[base]}$$

$$pOH = -\log K_b + \log\frac{[salt]}{[base]}$$

$pOH = -\log(1\times10^{-5}) + \log1 = 5$

$pH + pOH = 14$

$pH = 14 - 5 = 9$

(NEW NCERT 11th Part-I Page No. 203)

94. (2)

In methanol, the oxygen of the –OH group is attached to carbon by a sigma bond, formed by the overlapping of a sp^3 hybridised orbital of carbon with a sp^3 hybridised orbital of oxygen.

(NEW NCERT 12th Part-II Page No. 199)

95. (2)

The ortho and para isomers of nitrophenol can be separated by steam distillation. o-Nitrophenol is steam volatile due to intramolecular hydrogen bonding while p-nitrophenol is less volatile due to intermolecular hydrogen bonding which causes the association of molecules.

(NEW NCERT 12th Part-II Page No. 211)

96. (3)

Oxidation state of N in:

(I) $HNO_3 = +5$

(II) $NO = +2$

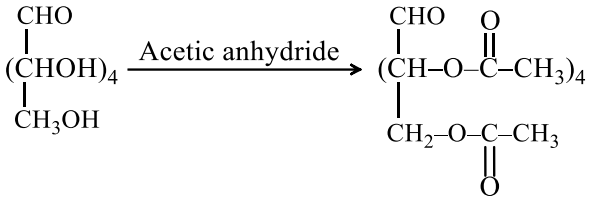
(III) $N_2 = 0$

(IV) $NH_4Cl = -3$

(NEW NCERT 11th Part-II Page No. 239)

97. (4)

Acetylation of glucose with acetic anhydride gives glucose pentaacetate which confirms the presence of five –OH groups.



(NEW NCERT 12th Part-II Page No. 283)

98. (2)

$$Xe(g) + 2F_2(g) \xrightarrow[\text{(1:5 ratio)}]{873K,\,7\,bar} XeF_4(s)$$

$$Xe(g) + 3F_2(g) \xrightarrow[\text{(1:20 ratio)}]{573K,\,60-70\,bar} XeF_6(s)$$

(OLD NCERT 12th Part-I Page No. 205)

99. (2)

$\pi \propto i$

(I) $MgSO_4 \rightarrow i = 2$

(II) $Al_2(SO_4)_3 \rightarrow i = 5$

(III) $C_{12}H_{22}O_{11} \rightarrow i = 1$

(IV) $[Co(NH_3)_5NO_2]Cl \rightarrow i = 2$

(NEW NCERT 12th Part-I Page No. 20)

100. (4)

Bond order of $O_2^{2-} = 1$

Bond order of $O_2^{+} = 2.5$

Bond order of $Be_2^{+} = 0.5$

Bond order of $N_2 = 3$

Bond order of $B_2 = 1$

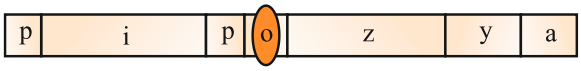
(NEW NCERT 11th Part-I Page No. 109)

(BOTANY)

SECTION-A

101. (2)

The *lac* operon consists of one regulatory gene (the *i* gene – here the term *i* does not refer to inducer, rather it is derived from the word inhibitor) and three structural genes (*z*, *y*, and *a*).



(NEW NCERT 12th Page No. 100)

102. (2)

As we go higher from species to kingdom, the number of common characteristics goes on decreasing. Lower the taxa, more are the characteristics that the members within the taxon share. Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level.

(NEW NCERT 11th Page No. 08)

103. (4)

Dinoflagellates are mostly marine and photosynthetic. They appear yellow, green, brown, blue or red depending on the main pigments present in their cells. The cell wall has stiff cellulose plates on the outer surface. Most of them have two flagella; one lies longitudinally and the other transversely in a furrow between the wall plates.

(NEW NCERT 11th Page No. 15)

104. (1)

Fusion between one large, non-motile (static) female gamete and a smaller, motile male gamete is termed oogamous, e.g., *Volvox, Fucus.*

(NEW NCERT 11th Page No. 24)

105. (2)

In symmetry, the flower may be actinomorphic (radial symmetry) or zygomorphic (bilateral symmetry). When a flower can be divided into two equal radial halves in any radial plane passing through the centre, it is said to be actinomorphic, e.g., mustard, *datura*, chilli. When it can be divided into two similar halves only in one particular vertical plane, it is zygomorphic, e.g., pea, gulmohur, bean, *Cassia*.

(NEW NCERT 11th Page No. 62)

106. (1)

In the hypogynous flower the gynoecium occupies the highest position while the other parts are situated below it. The ovary in such flowers is said to be superior, e.g., mustard, china rose and brinjal. If gynoecium is situated in the centre and other parts of the flower are located on the rim of the thalamus almost at the same level, it is called perigynous. The ovary here is said to be half inferior, e.g., plum, rose, peach.

(NEW NCERT 11th Page No. 63)

107. (3)

The adaxially placed palisade parenchyma is made up of elongated cells, which are arranged vertically and parallel to each other.

(NEW NCERT 11th Page No. 76, 77)

108. (2)

A special membranous structure is the mesosome which is formed by the extensions of plasma membrane into the cell. These extensions are in the form of vesicles, tubules and lamellae. They help in cell wall formation, DNA replication and distribution to daughter cells. They also help in respiration, secretion processes, to increase the surface area of the plasma membrane and enzymatic content.

(NEW NCERT 11th Page No. 90, 91)

109. (3)

A biological control being developed for use in the treatment of plant disease is the fungus *Trichoderma. Trichoderma* species are free-living fungi that are very common in the root ecosystems. *Aspergillus niger* (a fungus) of citric acid. The large holes in 'Swiss cheese' are due to production of a large amount of CO_2 by a bacterium named *Propionibacterium sharmanii*. The 'Roquefort cheese' are ripened by growing a specific fungi on them, which gives them a particular flavour. Streptokinase produced by the bacterium *Streptococcus* and modified by genetic engineering is used as a 'clot buster' for removing clots from the blood vessels of patients who have undergone myocardial infarction leading to heart attack.

(NEW NCERT 12th Page No. 151, 153, 157)

110. (4)

Both the species benefit in mutualism and both lose in competition in their interactions with each other. In both parasitism and predation only one species benefits (parasite and predator, respectively) and the interaction is detrimental to the other species (host and prey, respectively).

The interaction where one species is benefitted and the other is neither benefitted nor harmed is called commensalism. In amensalism onthe other hand one species is harmed whereas the other is unaffected. Predation, parasitism and commensalism share a common characteristic– the interacting species live closely together.

(NEW NCERT 12th Page No. 197)

111. (2)

On a logarithmic scale, the relationship between the species richness and area is a straight line described by the equation:

$\log S = \log C + Z \log A$

where

S = Species richness A = Area

Z = slope of the line (regression coefficient)

C = Y-intercept

(NEW NCERT 12th Page No. 220)

112. (3)

Placentation	Example
Axile	Lemon
Parietal	Mustard
Basal	Sunflower
Free central	*Primrose*

(NEW NCERT 11th Page No. 65)

113. (2)

The passage of protons through F_0 channel is coupled to the catalytic site of the F_1 component for the production of ATP. For each ATP produced, $4H^+$ passes through F_0 from the intermembrane space to the matrix down the electrochemical proton gradient.

(NEW NCERT 11th Page No. 160)

114. (2)

Plants follow different pathways in response to environment or phases of life to form different kinds of structures. This ability is called plasticity, e.g., heterophylly in cotton, coriander and larkspur. In such plants, the leaves of the juvenile plant are different in shape from those in mature plants. On the other hand, difference in shapes of leaves produced in air and those produced in water in buttercup also represent the heterophyllous development due to environment. This phenomenon of heterophylly is an example of plasticity.

(NEW NCERT 11th Page No. 173)

115. (3)

The interphase is divided into three further phases: G_1 phase (Gap 1); S phase (Synthesis) and G_2 phase (Gap 2).

S or synthesis phase marks the period during which DNA synthesis or replication takes place. During this time the amount of DNA per cell doubles. If the initial amount of DNA is denoted as 2C then it increases to 4C.

Cells in quiescent stage (G_0) remain metabolically active but no longer proliferate unless called on to do so depending on the requirement of the organism.

(NEW NCERT 11th Page No. 121, 122)

116. (4)

In an aquatic ecosystem, grazing food chain (GFC) is the major conduit for energy flow. As against this, in a terrestrial ecosystem, a much larger fraction of energy flows through the detritus food chain (DFC) than through the GFC.

(NEW NCERT 12th Page No. 210)

117. (2)

For every CO_2 molecule entering the Calvin cycle, 3 molecules of ATP and 2 of NADPH are required. To make one molecule of glucose 6 turns of the cycle are required. Therefore, 18 ATP and 12 NADPH are required.

In	Out
Six CO_2	One glucose
18 ATP	18 ADP
12 NADPH	12 NADP

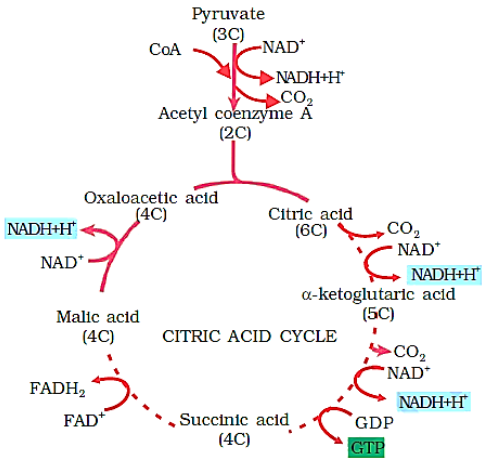
(NEW NCERT 11th Page No. 145)

118. (2)

Meiosis is a specialised kind of cell division that reduces the chromosome number by half results in the production of haploid daughter cells. This kind of division is called meiosis. Meiosis ensures the production of haploid phase in the life cycle of sexually reproducing organisms whereas fertilisation restores the diploid phase.

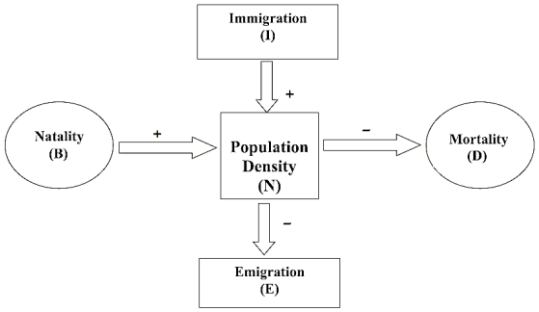
(NEW NCERT 11th Page No. 125)

119. (3)



(NEW NCERT 11th Page No. 159)

120. (4)



(NEW NCERT 12th Page No. 193)

121. (4)

Statins produced by the yeast *Monascus purpureus* have been commercialised as blood-cholesterol lowering agents. It acts by competitively inhibiting the enzyme responsible for synthesis of cholesterol.

(NEW NCERT 12th Page No. 153)

122. (2)

Ascomycetes commonly known as sac-fungi, the ascomycetes are mostly multicellular, e.g., *Penicillium*, or rarely unicellular, e.g., yeast (*Saccharomyces*).

Neurospora is used extensively in biochemical and genetic work. Many members like morels and truffles are edible and are considered delicacies.

(NEW NCERT 11th Page No. 17, 18)

123. (4)

Capping of hnRNA	Addition of methyl guanosine triphosphate
Tailing of hnRNA	Addition of adenylate residues
Sigma factor required for	Initiation of transcription
Rho factor required for	Termination of transcription

(NEW NCERT 12th Page No. 94, 95)

124. (3)

In the photorespiratory pathway, there is neither synthesis of sugars, nor of ATP. Rather it results in the release of CO_2 with the utilisation of ATP. In the photorespiratory pathway there is no synthesis of ATP or NADPH.

(NEW NCERT 11th Page No. 147)

125. (3)

When a cell loses the capacity to divide, it leads to differentiation. Differentiation results in development of structures that are commensurate with the function the cells finally has to perform. General principles for differentiation for cell, tissues and organs are similar. A differentiated cell may dedifferentiate and then redifferentiate. Since differentiation in plants is open, the development could also be flexible, i.e., the development is the sum of growth and differentiation.

(NEW NCERT 11th Page No. 178)

126. (1)

The inheritance of flower colour in the dog flower (snapdragon or *Antirrhinum sp.*) is a good example to understand incomplete dominance. In a cross between true-breeding red-flowered (RR) and true breeding white-flowered plants (rr), the F_1 (Rr) was pink. When the F_1 was self-pollinated the F_2 resulted in the following ratio 1 (RR) Red: 2 (Rr) Pink: 1 (rr) White.

ABO blood groups are controlled by the gene *I*. The plasma membrane of the red blood cells has sugar polymers that protrude from its surface and the kind of sugar is controlled by the gene. The gene (*I*) has three alleles I^A, I^B and *i*. The alleles I^A and I^B produce a slightly different form of sugar while allele *i* does not produce any sugar. When I^A and I^B are present together they both express their own types of sugars: this is because of co-dominance.

(NEW NCERT 12th Page No. 60, 61)

127. (3)

The sex organs in bryophytes are multicellular. The male sex organ is called antheridium. They produce biflagellate antherozoids. The female sex organ called archegonium is flask-shaped and produces a single egg.

(NEW NCERT 11th Page No. 29)

128. (4)

Based upon observations on dihybrid crosses (crosses between plants differing in two traits) Mendel proposed a second set of generalisations that we call Mendel's Law of Independent Assortment. The law states that 'when two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of characters'.

(NEW NCERT 12th Page No. 64)

129. (2)

In monocotyledonous stem, phloem parenchyma is absent, and water-containing cavities are present within the vascular bundles.

In dicot stem, the cells of the endodermis are rich in starch grains and the layer is also referred to as the starch sheath. The pericycle is present on the inner side of the endodermis and above the phloem in the form of semi-lunar patches of sclerenchyma. In between the vascular bundles there are a few layers of radially placed parenchymatous cells, which constitute medullary rays. A large number of vascular bundles are arranged in a ring; the 'ring' arrangement of vascular bundles is a characteristic of dicot stem.

(NEW NCERT 11th Page No. 75, 76)

130. (1)

The pyramid of biomass in sea is generally inverted because the biomass of fishes far exceeds that of phytoplankton.

In most ecosystems, all the pyramids, of number, of energy and biomass are upright, i.e., producers are more in number and biomass than the herbivores, and herbivores are more in number and biomass than the carnivores. Also energy at a lower trophic level is always more than at a higher level.

Pyramid of energy is always upright, can never be inverted, because when energy flows from a particular trophic level to the next trophic level, some energy is always lost as heat at each step. Each bar in the energy pyramid indicates the amount of energy present at each trophic level in a given time or annually per unit area.

(NEW NCERT 12th Page No. 217)

131. (3)

The golgi apparatus principally performs the function of packaging materials, to be delivered either to the intra-cellular targets or secreted outside the cell. Materials to be packaged in the form of vesicles from the ER fuse with the *cis* face of the golgi apparatus and move towards the maturing face. This explains, why the golgi apparatus remains in close association with the endoplasmic reticulum. A number of proteins synthesised by ribosomes on the endoplasmic reticulum are modified in the cisternae of the golgi apparatus before they are released from its *trans* face.

(NEW NCERT 11th Page No. 96)

132. (4)

Smooth Endoplasmic Reticulum	Involved in lipid synthesis
Centriole	Made of tubulin protein fibres
Golgi complex	Dense reticular structure near the nucleus
Rough Endoplasmic Reticulum	Involved in protein synthesis

(NEW NCERT 11th Page No. 95, 100)

133. (2)

Carboxylation is the fixation of CO_2 into a stable organic intermediate. Carboxylation is the most crucial step of the Calvin cycle where CO_2 is utilised for the carboxylation of RuBP. Ribulose 1, 5-bisphosphate is the carbon dioxide acceptor in C_3-plants.

(NEW NCERT 11th Page No. 143, 144)

134. (4)

Chasmogamous flowers which are similar to flowers of other species with exposed anthers and stigma, and cleistogamous flowers which do not open at all.

Geitonogamy - Transfer of pollen grains from the anther to the stigma of another flower of the same plant.

Xenogamy - Transfer of pollen grains from anther to the stigma of a different plant.

(NEW NCERT 12th Page No. 12)

135. (1)

Cytokinins help to produce new leaves, chloroplasts in leaves, lateral shoot growth and adventitious shoot formation. Ethylene also promotes root growth and root hair formation, thus helping the plants to increase their absorption surface.

Plant growth and development are under the control of both intrinsic and extrinsic factors. The role of PGR is of only one kind of intrinsic control. Along with genomic control and extrinsic factors, they play an important role in plant growth and development.

(NEW NCERT 11th Page No. 177, 178)

SECTION-B

136. (1)

Gametes in Human beings - Male - XY, Female - XX

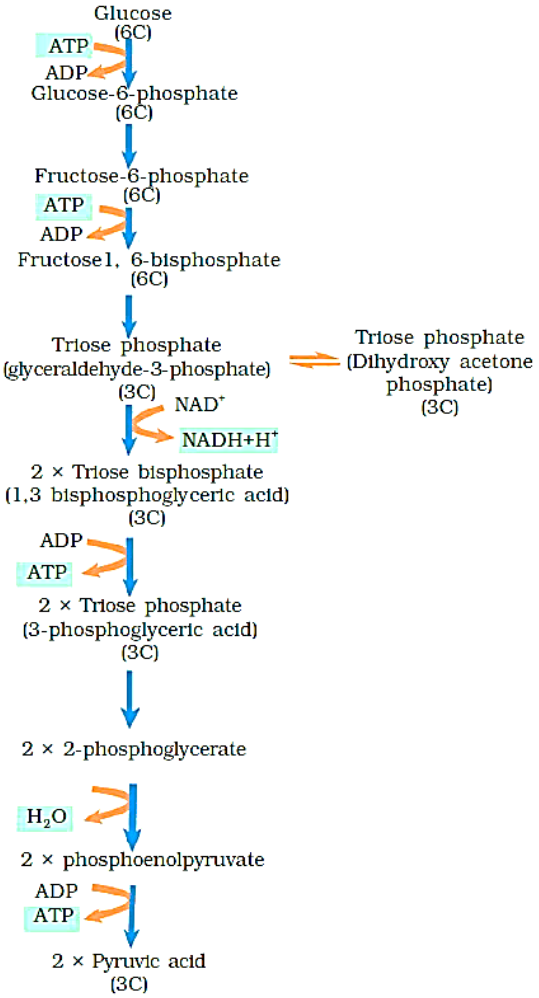
Gametes in *Drosophila* - Male - XY, Female - XX

Honey bee - Male reproduces by means of parthenogenesis

Gametes in Birds - Male - ZZ, Female - ZW

(NEW NCERT 12th Page No. 70, 71)

137. (4)



(NEW NCERT 11th Page No. 156)

138. (1)

In pea and bean flowers, there are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel); this type of aestivation is known as vexillary or papilionaceous.

(NEW NCERT 11th Page No. 64)

139. (3)

Pollen grains are generally spherical measuring about 25-50 micrometers in diameter. It has a prominent two-layered wall. The hard outer layer called the exine is made up of sporopollenin which is one of the most resistant organic material known. It can withstand high temperatures and strong acids and alkali. No enzyme that degrades sporopollenin is so far known. Pollen grain exine has prominent apertures called germ pores where sporopollenin is absent. Pollen grains are well preserved as fossils because of the presence of sporopollenin.

(NEW NCERT 12th Page No. 07)

140. (2)

According to the salient features of HGP, almost all (99.9 per cent) nucleotide bases are exactly the same in all people.

Chromosome 1 has most genes (2968), and the Y has the fewest (231).

(NEW NCERT 12th Page No. 104)

141. (1)

A population growing in a habitat with limited resources show initially a lag phase, followed by phases of acceleration and deceleration and finally an asymptote, when the population density reaches the carrying capacity. A plot of N in relation to time (t) results in a sigmoid curve.

(NEW NCERT 12th Page No. 195)

142. (4)

Autosomal dominant trait	Myotonic dystrophy
Autosomal recessive trait	Sickle-cell anaemia
Sex-linked recessive disorder	Haemophilia

(NEW NCERT 12th Page No. 73, 74)

143. (3)

In India, ecologically unique and biodiversity-rich regions are legally protected as biosphere reserves, national parks and sanctuaries. India now has 14 biosphere reserves, 90 national parks and 448 wildlife sanctuaries.

(NEW NCERT 12th Page No. 225)

144. (3)

Colombia located near the equator has nearly 1,400 species of birds while New York at 41° N has 105 species and Greenland at 71° N only 56 species.

(NEW NCERT 12th Page No. 219)

145. (1)

Mitosis is the equational division in which the chromosome number of the parent is conserved in the daughter cell.

Meiosis ensures the production of haploid phase in the life cycle of sexually reproducing organisms whereas fertilisation restores the diploid phase.

(NEW NCERT 11th Page No. 125, 129)

146. (3)

The genetic material is basically naked, not enveloped by a nuclear membrane. In addition to the genomic DNA (the single chromosome/circular DNA), many bacteria have small circular DNA outside the genomic DNA. These smaller DNA are called plasmids.

The ribosomes of the chloroplasts are smaller (70S) than the cytoplasmic ribosomes (80S).

(NEW NCERT 11th Page No. 90, 98)

147. (4)

Ecosystems are not exempt from the Second Law of thermodynamics. They need a constant supply of energy to synthesise the molecules they require, to counteract the universal tendency toward increasing disorderliness.

Primary producers convert only 1% of the energy in the sunlight available to them into NPP.

(NEW NCERT 12th Page No. 209, 213)

148. (2)

The salient features of genetic code are as follows:

(i) The codon is triplet. 61 codons code for amino acids and 3 codons do not code for any amino acids, hence they function as stop codons.

(ii) Some amino acids are coded by more than one codon, hence the code is degenerate.

(iii) The codon is read in mRNA in a contiguous fashion. There are no punctuations.

(iv) The code is nearly universal: for example, from bacteria to human UUU would code for Phenylalanine (phe). Some exceptions to this rule have been found in mitochondrial codons, and in some protozoans.

(v) AUG has dual functions. It codes for Methionine (met), and it also act as initiator codon.

(vi) UAA, UAG, UGA are stop terminator codons.

(NEW NCERT 12th Page No. 96)

149. (1)

Common Name	Mango	Wheat
Biological Name	*Mangifera indica*	*Triticum aestivum*
Genus	*Mangifera*	*Triticum*
Family	Anacardiaceae	Poaceae
Order	Sapindales	Poales
Class	Dicotyledonae	Monocotyledonae
Phylum/ Division	Angiospermae	Angiospermae

(NEW NCERT 11th Page No. 08)

150. (2)

Pachytene	Appearance of recombination nodules
Zygotene	Chromosomes start pairing together
Diplotene	Dissolution of the synaptonemal complex
Diakinesis	Terminalisation of chiasmata

(NEW NCERT 11th Page No. 126)

(ZOOLOGY)

SECTION-A

151. (4)

Receptors associated with aortic arch and carotid artery can recognise changes in CO_2 and H^+ concentration and send necessary signals to the rhythm centre for remedial actions. These are peripheral chemoreceptors.

(NEW NCERT 11th Page No. 190)

152. (1)

When an Rh-negative mother carries an Rh-positive fetus, there's a risk of sensitization during childbirth, where the mother's immune system may produce antibodies against the Rh antigen on the fetal red blood cells. Subsequent pregnancies with Rh-positive fetuses can lead to erythroblastosis fetalis, a condition where maternal antibodies attack fetal red blood cells, causing severe hemolytic anemia in the fetus.

(NEW NCERT 11th Page No. 196)

153. (4)

Each sarcomere has a central 'A' band which contains thick myosin filaments. Two half 'I' bands, which contains actin filament known as thin filaments on the side of A-band.

(NEW NCERT 11th Page No. 220)

154. (2)

Palmitic acid has 16 carbons including carboxyl carbon. Arachidonic acid has 20 carbon atoms including the carboxyl carbon.

(NEW NCERT 11th Page No. 106)

155. (3)

Phylum Echinodermata are spiny bodied and coelomate animal. The most distinctive feature of echinoderms is the presence of water vascular system which helps in locomotion, capture and transport of food and respiration. Fertilisation is usually external. Development is indirect with free-swimming larva.

(NEW NCERT 11th Page No. 45)

156. (3)

Sebaceous glands eliminate certain substances like sterols, hydrocarbons and waxes through sebum. This secretion provides a protective oily covering for the skin. Presence of glucose (Glycosuria) and ketone bodies (Ketonuria) in urine are indicative of diabetes mellitus. Serum is the blood without clotting factor.

(NEW NCERT 11th Page No. 213)

157. (2)

Aldosterone increases blood pressure and GFR whereas Atrial Natriuretic Factor decreases blood pressure. Glucagon increases blood sugar level and insulin decreases blood sugar level. Parathyroid hormone increases blood calcium level and calcitonin decreases blood calcium level. Relaxin is secreted during later phase of pregnancy and helps in parturition whereas inhibin stops secretion of FSH and works antagonistic to FSH.

(NEW NCERT 11th Page No. 245)

158. (4)

During secretory phase of menstrual cycle the levels of estrogen and progesterone increases whereas level of LH and FSH decreases during this phase.

(NEW NCERT 12th Page No. 34)

159. (2)

List-I	List-II
Nirodh	Sheath of penis
Diaphragm	Covers cervix
Multiload 375	Contains copper
Norplant	Implant under skin

(NEW NCERT 12th Page No. 44)

160. (3)

During ventricular diastole the ventricles relax and the ventricular pressure falls causing the closure of semilunar valves which prevents the backflow of blood into the ventricles. As the ventricular pressure declines further, the tricuspid and bicuspid valves are pushed open by the pressure in the atria exerted by the blood which was being emptied into them by the veins. The blood now once again moves freely to the ventricles.

(NEW NCERT 11th Page No. 200)

161. (4)

Fasciola, Wuchereria, Hirudinaria, Locusta, Loligo and *Saccoglossus* show bilateral symmetry. *Antedon* and *Aurelia* show radial symmetry.

(NEW NCERT 11th Page No. 44, 45)

162. (4)

Dependence is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs/alcohol is abruptly discontinued. This is characterised by anxiety, shakiness, nausea and sweating, which may be relieved when use is resumed again.

(NEW NCERT 12th Page No. 145)

163. (1)

Analogous structures are a result of convergent evolution in which different structures evolving for the same function and hence having similarity. Example are: The eye of octopus and of mammals, Sweet potato (root modification) and potato (stem modification). Examples of homologous organs are vertebrate hearts or brains. The thorn and tendrils of *Bougainvillea* and *Cucurbita*.

(NEW NCERT 12th Page No. 115)

164. (3)

In mammals, including humans, insulin is synthesised as a pro-hormone which contains an extra stretch called the C peptide. This C peptide is not present in the mature insulin and is removed during maturation into insulin.

(NEW NCERT 12th Page No. 182)

165. (4)

PCR stands for Polymerase Chain Reaction. In this reaction, multiple copies of the gene (or DNA) of interest is synthesised *in vitro* using two sets of primers and the enzyme DNA polymerase. Repeated amplification is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, *Thermus aquaticus*), which remain active during the high temperature induced denaturation of double stranded DNA.

(NEW NCERT 12th Page No. 172, 173)

166. (2)

Almost all enzymes are proteins. There are some nucleic acids that behave like enzymes. These are called ribozymes. Enzymes isolated from organisms who normally live under extremely high temperatures (e.g., hot vents and sulphur springs), are stable and retain their catalytic power even at high temperatures (upto 80°-90°C). Enzymes bring down activation energy barrier making the transition of substrate to product more easy.

(**NEW NCERT 11th Page No. 112, 113)**

167. (2)

Exopthalmic goitre is a form of hyperthyroidism, characterised by enlargement of the thyroid gland, protrusion of the eyeballs, increased basal metabolic rate, and weight loss, also called Graves' disease.

(NEW NCERT 11th Page No. 243)

168. (2)

The Rh antigen similar to one present in Rhesus monkeys (hence Rh), is observed on the surface of RBCs of majority (nearly 80 per cent) of humans. Such individuals are called Rh positive (Rh+ve). *Erythroblastosis foetalis* can be avoided by administering anti-Rh antibodies to the mother immediately after the delivery of the first child. Rh antibodies from the Rh negative mother can leak into the blood of the Rh positive foetus and destroy the foetal RBCs.

(NEW NCERT 11th Page No. 196)

169. (2)

Pons consists of fibre tracts that interconnect different regions of the brain. The inner parts of cerebral hemispheres and a group of associated deep structures like amygdala, hippocampus, etc., form a complex structure called the limbic lobe or limbic system. Along with the hypothalamus, it is involved in the regulation of sexual behaviour, expression of emotional reactions (e.g., excitement, pleasure, rage and fear), and motivation.

(**NEW NCERT 11th Page No. 236)**

170. (2)

In Syphilis, Gonorrhoea and Genital warts sex organs are affected. In AIDS, sex organs are not affected but, deficiency of immune system occurs which provide suitable condition for various diseases to attack body.

(NEW NCERT 12th Page No. 47)

171. (4)

Visceral organs are supplied with both sympathetic and parasympathetic nervous system and involuntary muscles.

(NEW NCERT 11th Page No. 231)

172. (1)

The brain capacities of *Homo habilis* were between 650-800cc. *Homo erectus* had a large brain around 900cc. The Neanderthal man has a brain size of 1400cc.

(**NEW NCERT 12th Page No. 124, 125)**

173. (4)

Many bony fishes, aquatic amphibians and aquatic insects are ammonotelic in nature. Mammals, many terrestrial amphibians and marine fishes mainly excrete urea and are called ureotelic animals. Reptiles, birds, land snails and insects excrete nitrogenous wastes as uric acid and are called uricotelic animals.

(NEW NCERT 11th Page No. 205)

174. (1)

Cnidarians are aquatic, mostly marine, sessile or free-swimming, radially symmetrical animals. Cnidarians exhibit tissue level of organisation and are diploblastic. Cnidarians exhibit two basic body forms called polyp and medusa. The former is a sessile and cylindrical form like Hydra, *Adamsia*, etc. whereas, the latter is umbrella-shaped and free-swimming like *Aurelia* or jelly fish.

(NEW NCERT 11th Page No. 41)

175. (3)

The uterus is single and it is also called womb. The wall of the uterus has three layers of tissue. The external thin membranous perimetrium**,** middle thick layer of smooth muscle, myometrium and inner glandular layer called endometrium that lines the uterine cavity. The endometrium undergoes cyclical changes during menstrual cycle while the myometrium exhibits strong contraction during delivery of the baby.

(NEW NCERT 12th Page No. 30)

176. (3)

An ideal contraceptive should be user-friendly, easily available, effective and reversible with no or least side-effects. It also should in no way interfere with the sexual drive, desire and/or the sexual act of the user.

(NEW NCERT 12th Page No. 43)

177. (1)

A ring of 6-8 blind tubules called hepatic or gastric caeca is present at the junction of foregut and midgut, which secrete digestive juice.

(OLD NCERT 11th Page No. 113)

178. (2)

The European Federation of Biotechnology (EFB) has given a definition of biotechnology that encompasses both traditional view and modern molecular biotechnology. The definition given by EFB is as follows: 'The integration of natural science and organisms, cells, parts thereof, and molecular analogues for products and services'.

(NEW NCERT 12th Page No. 163)

179. (2)

AIDS is caused by the Human Immuno deficiency Virus (HIV), a member of a group of viruses called retrovirus. The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The spleen is a large bean- shaped organ. It acts as a filter of the blood by trapping blood-borne micro- organisms.

(NEW NCERT 12th Page No. 137, 138)

180. (3)

Entamoeba histolytica is a protozoan parasite in the large intestine of human which causes amoebiasis **(**amoebic dysentery**)**. Symptoms of this disease include constipation, abdominal pain and cramps, stools with excess mucous and blood clots.

(NEW NCERT 12th Page No. 132)

181. (4)

List-I	List-II
First cellular form of life	2000 mya
First non-cellular form of life	3 bya
Origin of Earth	4.5 bya
Origin of jawless fish	350 mya

(NEW NCERT 12th Page No. 111, 121, 122)

182. (2)

Restriction enzymes cut the strand of DNA a little away from the centre of the palindrome sites, but between the same two bases on the opposite strands. This leaves single stranded portions at the ends. There are overhanging stretches called sticky ends on each strand. This stickiness of the ends facilitates the action of the enzyme DNA ligase.

(**NEW NCERT 12th Page No. 167)**

183. (1)

Functional Residual Capacity (FRC) is the volume of air that will remain in the lungs after a normal expiration. This includes ERV+RV.

(NEW NCERT 11th Page No. 187)

184. (3)

Cranial bones are: Parietal bones (Two),Temporal bones (Two), Frontal bone, Occipital bone, Sphenoid bone and Ethmoid bone.

(NEW NCERT 11th Page No. 224)

185. (3)

The organs of urinogenital system in frog (i.e., associated system of urinary and reproductive system) are kidneys and urinogenital ducts, which open into the cloaca.

(**NEW NCERT 11th Page No. 84)**

SECTION-B

186. (1)

Homo erectus fossils were discovered in Java in 1891. The Neanderthal man lived in near east and central Asia between 1,00,000-40,000 years back. Few fossils of man-like bones have been discovered in Ethiopia and Tanzania. *Australopithecines* were probably taller than 4 feet but walked upright.

(NEW NCERT 12th Page No. 124, 125)

187. (4)

Neurons, the unit of neural system are excitable cells. The neuroglial cell which constitute the rest of the neural system protect and support neurons. Neuroglia make up more than one- half the volume of neural tissue in our body. Bones have a hard and non-pliable ground substance rich in calcium salts and collagen fibres which give bone its strength.

(OLD NCERT 11th Page No. 104, 105)

188. (4)

Phalanges is present in hands and legs of human and contain 14 bones in each hand and leg. Phalangeal parts depends on the number of digits.

(NEW NCERT 11th Page No. 226)

189. (1)

An injury or a trauma stimulates the platelets in the blood to release certain factors which activate the mechanism of coagulation. Certain factors released by the tissues at the site of injury also can initiate coagulation. Fibrins are formed by the conversion of inactive fibrinogens in the plasma by the enzyme thrombin. Thrombokinase converts prothrombin into thrombin.

(NEW NCERT 11th Page No. 196)

190. (4)

A synapse is formed by the membranes of a pre-synaptic neuron and a post-synaptic neuron, which may or may not be separated by a gap called synaptic cleft. There are two types of synapses, namely, electrical synapses and chemical synapses. At electrical synapses, the membranes of pre- and post-synaptic neurons are in very close proximity. Electrical current can flow directly from one neuron into the other across these synapses. Transmission of an impulse across electrical synapses is very similar to impulse conduction along a single axon. Impulse transmission across an electrical synapse is always faster than that across a chemical synapse. Electrical synapses are rare in our system.

(NEW NCERT 11th Page No. 234)

191. (4)

Doliolum belongs to Urochordata which contains exclusively marine animals. In Urochordata, notochord is present only in larval tail, while in Cephalochordata, it extends from head to tail region and is persistent throughout their life.

(NEW NCERT 11th Page No. 46)

192. (2)

Each nucleotide has three chemically distinct components. One is a heterocyclic compound (cyclic nitrogenous base), the second is a monosaccharide (pentose sugar) and the third a phosphate group.

(NEW NCERT 11th Page No. 111)

193. (4)

Hypothyroidism during pregnancy causes defective development and maturation of the growing baby leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc. In adult women, hypothyroidism may cause menstrual cycle to become irregular. Hyperthyroidism adversely affects the body physiology. Underproduction of hormones by the adrenal cortex alters carbohydrate metabolism causing acute weakness and fatigue leading to a disease called Addison's disease.

(NEW NCERT 11th Page No. 242, 243, 244)

194. (1)

Partial pressure of oxygen in mm of Hg at different regions are as follows.

Atmospheric air	159
Blood in systemic arteries	95
Alveoli	104
Tissue	40

(NEW NCERT 11th Page No. 187)

195. (3)

Agarose gel electrophoresis is employed to check the progression of a restriction enzyme digestion. DNA is a negatively charged molecule, hence it moves towards the positive electrode (anode). It is used to separate DNA fragments based on the size which had been cut by the action of restriction enzyme.

(NEW NCERT 12th Page No. 172)

196. (2)

Each antibody molecule has four peptide chains, two small called light chains and two longer called heavy chains. Light and heavy chains are linked each other by disulphide bond.

(NEW NCERT 12th Page No. 135)

197. (2)

List-I	List-II
Interstitial space	Leydig cells
Seminiferous tubule	Highly coiled tube
Sertoli cells	Nourishment
Male germ cells	Spermatogonia

(NEW NCERT 12th Page No. 27)

198. (2)

Intensively lactating mothers do not generally conceive which is a natural method of contraception. It is due to suppression of release of gonadotropins by high level of prolactin.

(NEW NCERT 12th Page No. 240, 241)

199. (3)

RNA*i* takes place in all eukaryotic organisms as a method of cellular defense. This method involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevents translation of the mRNA (silencing).

(NEW NCERT 12th Page No. 180)

200. (2)

Kidney not only remove the waste products from the blood but also play a very important role in maintaining blood pressure constant by secretion and reabsorption of substances as ADH acts on kidney which reabsorb water and ions to maintain blood pressure.

(NEW NCERT 11th Page No. 212)

■■■

PW Web/App - https://smart.link/7wwosivoicgd4

Library- https://smart.link/sdfez8ejd80if